

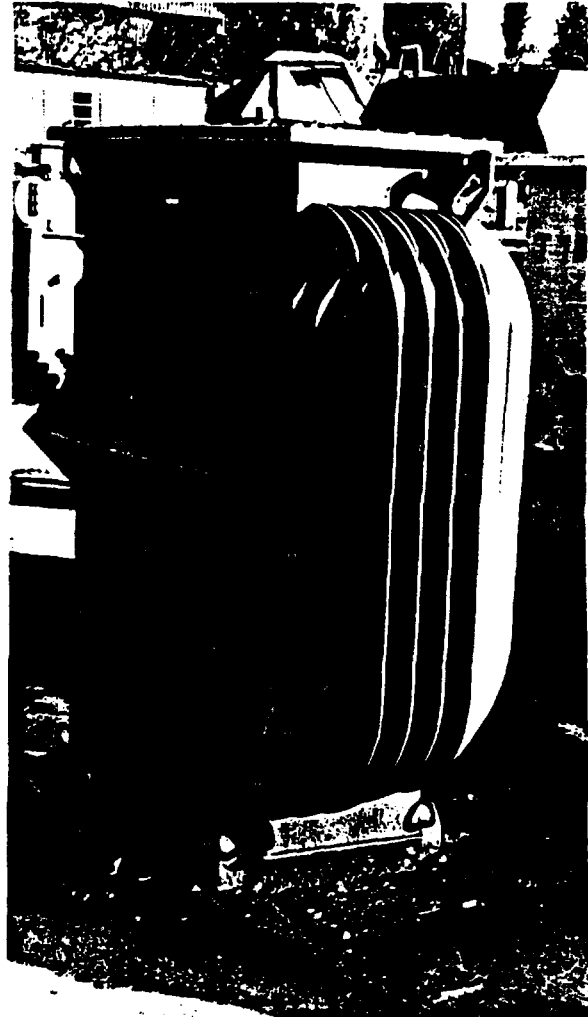
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KINGDOM OF LESOTHO

LESOTHO ELECTRICITY CORPORATION

**UTILITIES SECTOR REFORM
PROJECT**

**ENVIRONMENTAL
REVIEW**



MAIN REPORT

June 2000

**Cover Photo: Leaking transformer in equipment
compound at LEC head office, Maseru**

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
EIA	Environmental Impact Assessment
ESKOM	(Electricity Supply Company [South Africa])
GNP	Gross National Product
GOL	Government of Lesotho
HSA	Health Service Areas
IDA	International Development Association
IECs	Important Environment Components
IFC	International Finance Corporation
LEA	Lesotho Environment Authority
LEC	Lesotho Electricity Corporation
LEMP	Lesotho Energy Master Plan
LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
MIGA	Multilateral Investment Guarantee Agency
MNR	Ministry of Natural Resources
NAP	National Action Plan
NEAP	National Environmental Action Plan
NES	National Environment Secretariat
RSA	Republic of South Africa

SUMMARY

. background and purpose

The Utilities Sector Reform Project is a Category B project as classified by the World Bank. It also falls within the requirements of the Government of Lesotho Environmental Act 1999 for an environmental impact assessment. An environmental review of the residential and business hookup phase of the project, of which some 9,000 residents and small businesses will qualify, has been conducted. The review identifies potential impacts and the mitigative measures to be taken to avoid / minimize the impacts. The review will ensure, through the management plan, that environmental conflicts and future social and other costs incurred as a result of such conflicts, are avoided.

. legal framework

The anchor to Lesotho's comprehensive legal instrumentation to ensure that the country's environment is protected is the Environmental Act 1999. Predating the Act is the National Environmental Action Plan which was prepared in response to increasing concern over the country's environmental degradation. The plan provides the framework for the integration of environmental considerations into the planning and decision making process for social and economic development.

National environmental policy focuses on the assurance of the protection and conservation of the environment with a view of achieving sustainable development for Lesotho. With further reference to the Environment Act 1999, this policy focus is supported with the Act's requirement that an environmental assessment is required for any development project that could have a significant impact on the natural or human environments. The EIA process outlined in the EIA guidelines is comprehensive. Of particular interest is the requirement that those affected by a particular development, and the general public at large, are encouraged to participate in the impact assessment of the project.

. benefits and impacts

The benefits of the project are several and important, not the least of which will be the improved socioeconomic conditions to be realized by the residents and small businesses that will receive electricity connections.

Fifteen important environmental components were examined. These, from a potential list of many, were deemed to be the ones upon which the project could have a significant effect. Any impact was bounded by the immediate site of residential connections except where water contamination could occur downstream and off-site as a result of on-site activities.

A number of criteria including severity, extent, duration, frequency of occurrence, probability of occurrence, and possibility of reversibility were considered when determining the level of significance of each potential impact.

The project is generally environmentally benign, however, one potential impact is highly significant. Poles that have been treated with a wood preservative are imported from South Africa and are used by LEC for residential connections. It was indicated that the wood preservative used is creosote, a product of coal-tar and wood-tar distillation. Creosote is considered to be highly toxic and can readily leach into surrounding soil and groundwater. A successor to creosote in North America is pentachlorophenol which has been proven to be more toxic than creosote but it is not known if this preservative is used in Lesotho. The impact of creosoted poles extends beyond potential soil and water contamination. If children come in contact with freshly treated poles their health could be affected.

During this environmental review further investigation into the impacts of preserved poles was not undertaken. It is strongly recommended that during the course of the project further research, both a literature search and field research, be undertaken regarding the use of preservatives and their effects on the environment. If further research warrants it, a monitoring program should be established to examine the effects, if any, of preserved poles on water and soil contamination as well as the direct effect on human health. Mitigation could include the use of a different type of pole preservative.

. mitigation

Most of the impacts can be avoided through the application of good practices, a basic set of which has been prepared as part of this environmental review. The one potential impact that must be dealt with directly is the above mentioned situation with preserved utility poles.

. residual impacts

Assuming that all mitigation is acted upon, there could be two residual impacts: i) a minor impact on aesthetics which is easily off-set by the socioeconomic advantages to be gained through the project; and, ii) a more important impact on the health of young children who may, through their curiosity, come in contact with creosote poles.

. alternatives

There are two alternatives to the project: i) no project, which would lead to none of the socioeconomic benefits to be gained by the project, and, ii) solar energy with the use of individual panels on each residence and business. The latter impact is impractical and too costly. Wind power, although an alternative to electrical generation, would still require connections to each house and small business.

. *management plan*

A management plan that outlines mitigation required, responsibilities, scheduling and a reflection on costs for mitigation, has been prepared. As well, the plan provides a description of good practices to be followed as these relate to potential impacts. The plan discusses training requirements for LEC personnel and addresses monitoring and reporting requirements.

1. INTRODUCTION AND BACKGROUND

1.1 Purpose

The purpose of an environmental review of the Utilities Sector Reform Project is to meet the requirements of the World Bank as set out in Operational Directives 4.01 for Category B projects. As well, the review will meet the environmental assessment requirements of the Government of Lesotho for new development projects. The environmental review will ensure that environmental conflicts and future social and other costs incurred as a result of such conflicts, are avoided. Any potential environmental impacts will be avoided through appropriate design, good practices and effective management.

1.2 Project

The Lesotho Electricity Corporation (LEC) has a customer base of 15,000 representing a service coverage ratio of about 3%. Its primary functions include transmission and distribution. Power is purchased partly from the recently commissioned Muela hydro power station, and partly from the South Africa electricity supply company (ESKOM). LEC has experienced serious managerial, operational and financial problems in recent years, and its financial losses create a serious and unsustainable fiscal burden. As part of the Bank/Fund PRSP consultations, Government of Lesotho (GOL) has agreed to undertake immediate steps to reverse the performance problems of LEC, restore financial viability, establish a regulatory framework and look for a strategic investor. The proposed project will support the Government in its reform of the electricity sector.

With a healthy electricity sector, the Government's goals of achieving and maintaining external competitiveness as well as promoting private sector development will be pursued. The focus for this environmental review is the component of the project that will address the backlog of electricity connections, of which there are some 9,000.

The beneficiaries of the overall project will be the electricity consumers of Lesotho who will be provided with a reliable supply of electricity at reasonable rates, and a service and maintenance system that will respond effectively and efficiently.

1.3 Electricity Supply in Lesotho

1.3.1 Policy and Strategy

The Electricity Act of 1969 provides for the establishment of the Lesotho Electricity Corporation and for the exercise and performance by the Corporation of functions relating to the generation, transmission, distribution and supply of electricity. The Corporation is also responsible for the inspection and testing of electrical plants and safe use of electricity.

1.3.2 General Description¹

LEC has a consumer base of 15,000 households which represents 3% of the country's population. According to the Lesotho Electricity Master Plan (LEMP) LEC was mandated to increase its consumer base by 5% of households (from a current base of 15,000 households) by the end of 2000. Due to high demand coupled with the financial problems LEC encountered at the time, it could not fulfil this commitment although many people showed interest in being connected. Some people have applied individually to LEC whilst others have applied in groups and yet others have collected amounts in their accounts and have made contributions to LEC under the Maseru South Electrification Project. LEC is unable to service these customers due to lack of both human and financial resources.

The company opted for outsourcing of some of its projects to local electrical contractors to relieve the backlog and meet the increasing demand. LEC gets most of its electricity from Muela Hydro (72MVA) and partly from ESKOM. Power is also derived from several mini hydro schemes and in total these serve 587 customers.

Other forms of energy in use for electrical power conservation include biogas, biomass and solar energy.

The major problems LEC faces in addition to transmission losses are electricity theft by consumers and a poor billing system include numerous outages caused by aging infrastructure and very poor public relations as a result of inadequate training for dealing with the public.

The cost to connect a customer in the rural areas is as high as M15,000 per person while the connection cost in the urban areas is M3,500 per person. The difference in price is due to the infrastructure availability in the urban areas and its absence in rural settings. Contributing to the high costs of electrification in the rural areas is inadequate physical planning and distance of villages from the grid as well as the fact that all material used in electrification projects is purchased from South Africa.

The number of new customers connected has risen dramatically since 1994 when the scheme policy was introduced. The number declined in 1998 when the corporation faced financial problems. Current new connections are carried out at the rate of 150 customers per month.

Additional small mini-hydro plants are planned throughout the country to meet the growing demand for electricity. In the future it is envisioned that Lesotho will be able to export electricity to the RSA.

1.3.3 Public Involvement and Information

Communication between LEC and the public is usually through the media. For groups that wish to apply for connections, pistos are organized at the village level and discussions are

¹ World Bank. 2000.

held with LEC and the group representatives making the application. Whenever LEC is in the position of making group connections, the public is informed.

1.4 Related Activities

The most significant and recently completed related activity is the Muela hydroelectric station which is an integral part of the Lesotho Highlands Water Project (LHWP). The Muela station allows Lesotho to be self-sufficient in electrical power, removing the dependence that the country has had for many years on ESKOM, the South African power supply agency. Although power from Muela is significantly more costly than purchased power from ESKOM, it provides the country with important political and economic independence.

Two other ongoing projects are providing supply services. One is the rehabilitation of the Khukhune Lesteng power line which will supply electricity to Mokhotlong. The other project is the second phase of the South and Central Electrification Project which includes the development of a 132kV power line (Mazenod – Mafeteng), a double 22kV line between Mafeteng and Makhakhe, and the Likhoele sub-station.

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 National Development Plan²

'It continues to be the Government's objective to make energy supply available to all sectors and regions of Lesotho at minimum social, economic and environmental cost.'

One of the stated strategies to achieve this objective is to extend the electricity supply system. This strategy and others as stated in the National Development Plan, are outlined in the LEMP.

During the sixth national development plan period (1996/97-1998/99) it was the aim of government to sustain development in the areas of power generation, transmission and distribution, rural electrification, and conservation. The seventh national development was not available at the time of this EA preparation.

The sixth national development plan target was to make electricity available to 5% of the population, equivalent to 20,000 household connections, by the end of the century (2000). This compares to the 2% level or 10,800 metered electricity consumers connected in 1988. Realizing that targets could not be met, the LEMP was prepared to address, amongst others, the following relevant issues:

- . review of existing transmission and distribution system for the entire country and proposed program of improvement, modifications and extension of the system;

² Government of Lesotho. 1997.

- . achieve a long term target of 40,000 urban and 6,000-10,000 rural household connections by the year 2010;
- . improvement in the reliability of the LEC system.

The Master Plan recommended that the power sector be de-monopolized.

2.2 Energy Policy and Legislation

The Lesotho Electricity Supply Act (1969) and the Electricity Regulations (1970) provide the legal framework within which the Lesotho Electricity Corporation is able to conduct its responsibilities.

According to the Lesotho Electricity Supply Act of 1969, the responsibility for generation, transmission and distribution of electricity rests with the LEC. The regulations, as amended in 1970, also provide specific operating rules regarding conditions of supply, service requirements, installation requirements and measurements and payment procedures. The act was further amended to accommodate electricity generation, transmission and distribution by the Lesotho Highlands Development Authority (LHDA). This was intended that LHDA, through proposed hydropower generation and associated infrastructure, would compliment LEC activities.

The overall policy of the energy sector is to secure energy supply for all sectors and regions of Lesotho at a minimum social, economic and environmental cost. Demand and supply measures intended to achieve this goal have been developed.

2.3 Institutional Framework

Three ministries are concerned with energy issues: Ministry of Natural Resources (MNR), Ministry of Agriculture, Co-operatives and Marketing, and, the Ministry of Home Affairs.

MNR was established in 1993 through an amalgamation of the Ministry of Water, Energy and Mining, and, the Ministry of Lesotho Highlands Water and Energy Affairs. The MNR is charged with the responsibility of co-ordinating research, development and exploitation of natural resources. The ministry has two departments: the Department of Energy and the Department of Water Affairs, both of which have responsibilities within the energy sector. The function of the former is to co-ordinate all matters related to energy policy, production, procurement and consumption. The latter department has the main function of hydrological data collection and analysis.

MNR has two parastatals that play a pivotal role in the power sector: the Lesotho Electricity Corporation (LEC) and the LHDA. The LEC was created in 1969 as the sole body responsible for electricity generation, transmission, distribution and supply in Lesotho.

Other responsibilities of LEC, in addition to those stated in the above section, include establishing, acquiring, maintaining and operating transmission lines and generating plants. In carrying out its mandate LEC has developed mechanisms for consultations and

coordination with other key institutions in the power sector. At a working level, various coordinating committee meetings with other institutions, both individually and collectively depending on issues at hand, are conducted. At the Board of Directors level, the Permanent Secretary of MNR supervises LEC, providing policy direction and ensuring that government's interests are safeguarded.

2.4 Environmental Legislation and Policy

. *National Environmental Action Plan*

Lesotho's environmental degradation prompted the government to formulate the National Environmental Action Plan (NEAP) in 1989. NEAP provides the framework for the integration of environmental considerations into the planning and decision making process for social and economic development.

The NEAP identifies the areas of environmental concern which are the highest priority and specifies the actions necessary to address these areas. It defines national environmental policy for Lesotho and describes the institutional and legislative structures required to implement that policy.

The emphasis of the NEAP is the establishment of an appropriate institutional structure and policy framework and the description of actions required to address specific issues.

. *Environmental Bill 1997*

The Environmental Bill 1997 is an Act to establish the Lesotho Environment Authority (LEA) and to describe its functions. It also provides for the management of the environment and all natural resources for Lesotho and for connected matters. The Bill became the Environment Act 1999.

A number of principles of environmental management, which the LEA will ensure are followed, are described in the Act. Amongst these principles is the one that requires: *'prior environmental impact assessment of proposed projects or activities which are likely to have adverse effects on the environment or natural resources'*

. *National Environmental Policy for Lesotho*

Citizens of Lesotho have a right to a healthy and productive environment as reflected in the Constitution, Section 36. The National Environmental Policy aims at bridging the gap between inadequate and existing policies and legislation, and the lack of inter-sectoral coordination and cooperation. The goal of the policy is " *to ensure the protection and conservation of the environment with a view of achieving sustainable development for Lesotho*". It will enhance and support sectoral policies by addressing cross-sectoral linkages for sustainable development. The basis of the policy is to conserve and improve the environment with a view to contributing to the quality of life.

. Review of Agenda 21 Implementation in Lesotho

Lesotho has endorsed the global Agenda 21 on Environment and Sustainable Development. The results of a national workshop to respond to Agenda 21 were formulated as recommendations and incorporated into the NAP for implementation. The plan was formulated with a new approach to actively promote sustainable development and environmental management. Three broad categories of programs relating directly to Lesotho's national development priorities were identified. These categories included: Social and Economic Dimensions; Conservation and Management of Natural Resources; and, Participation of People.

The main objective of the report (Review of Agenda 21 Implementation in Lesotho) was to outline the methods used by various ministries, other institutions and major groups to implement Lesotho's Agenda 21.

2.5 Guidelines for Environmental Impact Assessment

A key component of the Environmental Act 1999 is the prescription of detailed requirements governing the conduct of environmental impact assessments for development projects that might have a significant impact on the natural or human environments. The environmental impact assessment (EIA) fulfills one of the major objectives of the Lesotho national environmental policy, that is, *"to ensure that environmental considerations are incorporated into decision-making processes during the formulation, implementation, and management of development policies, programs and projects at central and decentralized levels"*

Lesotho's EIA process is designed to integrate EIA requirements within the project cycle. The integration is intentional in order that EIA can provide environmental information at key stages in the project cycle and at the level of detail appropriate for that stage. Thus, whenever possible, impacts can be avoided or minimized through planning and design that accomplish both environmental protection and economic development objectives.

The EIA guidelines are comprehensive and include information and instructions that are common to most sets of EIA guidelines found throughout Africa. Steps that are to be followed in the process include:

- Step 1: Determination of the need for an EIA
- Step 2: Development and submission of a project brief (including discussion of alternatives)
- Step 3: Classification of proposal
- Step 4: Scoping of environmental impact statement
- Step 5: Preparation and submission of environmental impact statement
- Step 6: Review and evaluation of environmental impact statement
- Step 7: Review and evaluation of project

Step 8: Record of decision

Step 9: Administrative request for reconsideration of decision (if required)

Step 10: Judicial appeals

Contents of the EIA are similar to most other EIAs, and basically have been followed in the preparation of this environmental review.

2.6 National Environment Secretariat

The National Environment Secretariat (NES) was established in the mid 1990's with a principal mission of formulating and implementing the national environmental policies and programs.

The NES has developed a comprehensive national environmental policy and has established an appropriate regulatory framework including the provision of guidelines and standards for enacting and updating legislation for EIA in project management. It is also responsible for the enforcement of regulations on the basis of research, monitoring and compliance requirements; management of data required for effective environmental management; and the preparation of annual reports on the environment. It also develops outreach programs for environmental awareness, and for building public participation into decision making.

The NES also addresses sustainable human development and environment conservation through land rehabilitation and land use planning at district levels.

2.7 Treaties and Conventions

Lesotho is party to a number of international environmentally related conventions. The relevant conventions include:

- . Vienna Convention for the Protection of the Ozone Layer
- . Montreal Protocol on Substances that deplete the Ozone Layer
- . United Nations Framework Convention on Climate Change
- . Convention on Biological Diversity
- . United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa

The following environmental legislation signed but not yet ratified:

- . African Convention on the Conservation of Nature and Natural Resources
- . Treaty Establishing the African Economic Community

The project will have little effect on the conventions to which Lesotho is a signatory. The most important of the above conventions, with regards to the project, will be the ones related to climate change and biodiversity, however, the impacts and the contribution to cumulative

impacts will be so insignificant as to be negligible. These two conventions are briefly described in the following.

. United Nations Framework Convention on Climate Change

The objective of the Convention is to regulate levels of greenhouse gas concentration in the atmosphere, to avoid the occurrence of climate change on a level that would impede sustainable economic development, or compromise initiatives in food production. Parties are to protect the climate system for present and future generations. Developing countries are to be accorded appropriate assistance to enable them to fulfil the terms of the Convention. Parties are to work in cooperation in order to obtain maximum benefit from initiatives in the control of the climate system.

. Convention on Biological Diversity

The objective of the Convention is to conserve biological diversity, to promote the sustainable use of its components, and encourage equitable sharing of the benefits arising out of the utilization of genetic resources. The Convention promotes the appropriate transfer of technology, taking into account existing rights over such resources and such technology. Parties are obliged to provide for environmental impact assessment of projects that are likely to have significant adverse effects on biological diversity.

2.8 Public Involvement

Public notice is provided for all activities which are undertaken by LEC. According to the EIA guidelines. The public is encouraged to participate in the EIA process and specifically be included in the process at three distinct stages.

Upon receiving the project brief the Lesotho Environment Authority will publish the brief in a minimum of three newspapers and will provide copies of the brief to the communities of the affected areas. Consultation will also be carried out in these communities. Once the scoping document has been prepared it is a public document and can be inspected by any person at a place and time determined by LEA. Within one month of the receipt of an environmental impact statement from the proponent, and which is deemed proper in form and content, the LEA will publish the statement in at least three newspapers and will indicate where the statement can be reviewed. The public will be invited to make comment. Comments will be specifically solicited from those to be affected by the development. As well, the proponent will be required to distribute copies of the statement to all communities, interested and affected parties. LEA will require the holding of a public hearing for persons most likely to be affected by the proposal.

3. PROJECT DESCRIPTION³

3.1 Project Objectives

The objective of the project is to halt the fiscal drain arising from LEC's loss-making performance, to introduce efficiency into the management and operation of the company with private sector involvement, and to approach international standards of service and efficiency. With a healthy electricity sector, the Government's goals of achieving and maintaining external competitiveness as well as promoting private sector development will be pursued.

3.2 Project Components

The project will:

- . assist with the identification of, and negotiate with, a suitable strategic investor, through the appointment of a professional advisory team;
- . provide an interim management task force to run LEC until the strategic investor is in place, and to hold this temporary management team accountable for addressing the backlog of electricity connections;
- . establish a regulatory agency that can implement the draft regulatory framework which is already in place;
- . streamline the staffing of LEC, including retaining workers who will remain, and provide training and severance packages for workers who will be deployed.

There will also be the need for a communications strategy on three fronts: internal to LEC, from LEC to its customer base, and marketing LEC to the universe of potential strategic investors.

3.3 Project Financing

Approval will be sought for an IDA Credit of approximately \$15 million to finance the above components.

3.4 Project Sustainability

The project will make an investment in the improved financial and operational performance of LEC. This project has the short term objectives of reversing the fiscal drain and attracting a private sector, strategic investor to LEC. Future issues, such as how to best expand the coverage of electricity services in urban areas of the country by attracting private capital, will become more clear once dialogue with potential strategic investors has been initiated. If it is felt that some multilateral support (IFC, MIGA) is needed in order to give comfort to, or reduce financial costs of, private capital, then this will be the subject of a follow-up operation.

³ World Bank. 2000.

4. METHODOLOGY

4.1 General

The only aspect of the project that is of some environmental concern is the rural and urban hookups and related activities. A team of two individuals was used to determine the potential impacts that this aspect of the project could have on the environment. A field trip in and around Maseru where the majority of connections will take place was conducted. This allowed the team to gain an appreciation for what will be involved in providing connections to residences and small businesses. In addition to the actual hookups (from the nearest 11kV line into the residence to be connected) consideration has also been given to central handling, storage and maintenance of materials and equipment required for carrying out the hookups.

4.2 Baseline Data

No baseline data other than general descriptions of the social and biophysical environment have been used in this review. Since specific individual properties to receive connections have not been identified, the review has been treated generically (strategically). A focus has been given to those general and significant environmental problems that the country is currently addressing (e.g. pollution, soil erosion, impact on vulnerable species).

4.3 Stakeholder Participation

Due to the generally environmental benign nature of the project, no stakeholders, with the exception of the planning department of the LEC, have been involved in the undertaking of this environmental review.

4.4 Scoping and Bounding

The team examined the urban on-site social biophysical parameters, and considered, from experience, the rural on-site parameters. Scoping for the biophysical parameters related to the generic major environmental concerns and these were selected for assessment purposes. A discussion amongst the team members determined the most important social parameters that would be addressed. Scoping resulted in the identification of 16 important environmental components (IECs). Components identified were those which were felt sufficiently important to consider for protection within the context of the project.

Bounding was discussed and it was decided that the bounds of the review would be contained within the immediate site of the individual hookups (from main line to residence) except where water quality downstream could be affected.

4.5 Criteria and Rating System for Significance of Impact

Potential impacts have been categorized as to their level of significance on one of three levels – High (H), Moderate (M), or Low (L). These ratings are relative to one another and

should not be compared to levels of significance of impacts for other projects. For instance, a Very High level of significance was given to the potential loss of a faunal species on the Lesotho Highlands Water Project (Phase 1B) but all potential impacts of the Lesotho Utilities Support Project are minor (with the possible exception of one potential impact) in comparison.

Criteria used for determining the level of significance include severity of the impact, the extent of the impact, the duration of the impact, the frequency of occurrence, the probability of occurrence, and the possibility of reversibility. A formal numerical assessment of each criteria was not carried out although this would be the procedure for a more complex project and one that would result in a large number of highly significant and very highly significant impacts. The criteria were discussed and a subjective level of significance rating was given for each of the potential impacts.

5. DESCRIPTION OF THE ENVIRONMENT

5.1 Biophysical Resources

. Note

The project focuses on the connection of rural and urban households. The majority of the connections will be in the urban area where the following natural environment (biophysical) description is somewhat irrelevant. It is included here to provide the reader with general background information, and of course, important information when considering potential impacts of connections in the rural areas.

. Location, Climate and Topography⁴

Lesotho is a mountainous landlocked country of about 30,000 km² completely surrounded by the Republic of South Africa. It is situated at the highest part of the Drakensberg escarpment of the eastern rim of the South African plateau. The country is classified into four physiographic regions: the lowlands; the foothills; the Senqu Valley region; and, the higher mountain region.

The lowlands range from 1400m to 1800m in elevation and consist of a belt varying from 20 to 50km in width along the western border. About 80% of the country's productive lands are in this region, as is the majority of the country's population. Geology of this area is dominated by eroded sandstone. Soils tend to be shallow and highly erodible particularly where non-permeable clay layers lie beneath shallow sandy soil cover.

The foothills have elevations ranging from 1800 to 2000m and form a narrow strip running northeast to southwest and lying adjacent to the lower mountain range. This land covers 8% of the country and supports a high population density.

⁴ Government of Lesotho. 1989.

The Senqu Valley region has elevations ranging from 1400 to 1800m and it is the major grassland area marked by shallow soils. The population of the region largely depends on livestock and mixed farming.

The mountains range from 2000 to 3400m and are primarily used for summer grazing. Basalt is the dominant geological material.

Rainfall in the country ranges from 400-500mm annually in the southern lowlands and increases up to 700-900mm annually in the northern lowlands. Most mountain areas experience higher rainfall.

. Flora and Fauna

It is the Highlands of the country that displays the most interesting variety of flora and fauna, and ecosystems that are undisturbed relative to the more densely populated areas of the lowlands. In the Highlands, 250 species of birds, 50 species of mammals and 30 species of amphibians and reptiles are found. There are ten species of Red Data bird species. The Highlands also has endemic and endangered species of plants, a fish and an amphibian as well as the presence of unique and significant habitats. The Highlands also is host to a rich variety of medicinal plants and herbs.

5.2 Socioeconomic Conditions⁵

. Economics and Poverty

Lesotho's 1995 per capita GNP of M2206 (equivalent to US\$613) places the country among the higher income countries in Sub-Saharan Africa. The country has a high inequity in income distribution and 10% of the households in higher income groups receive 44% of gross national income while the bottom 40% receive only 8% of the income. About 50% of households in Lesotho are poor and more than 25% are very poor. It is estimated that 90% of the poor and very poor reside in the rural areas. The mountain areas experience the deepest and most severe poverty, estimated at double the national average.

. Employment

About 9% of Lesotho's labor force is employed in the formal sector, 20% in the informal sector and 15% as migrant workers in South Africa. Between 1987 and 1995 there has been a fall in the migrant work force largely as a result of declining mining activity in South Africa. The remainder of the labor force is either openly unemployed or engaged in subsistence agriculture.

⁵ Government of Lesotho. 1997.

. Population

The population of Lesotho was estimated at about two million in 1996, comprising one million females and 990,000 males. Young people under the age of 14 constitute about 41% of the population, whereas labor-aged persons, aged 15-64, constitute about 55%. The majority of the labor force engages in subsistence farming, which is characterized by low productivity and income.

. Health and Education

More than 88% of approximately 360,000 children are enrolled in a primary school system that is severely overcrowded and understaffed. Health service areas (HSAs), health centres and community health workers are responsible for delivering health care throughout the country. HSA hospitals are a key element of the health infrastructure, providing clinical care and supporting primary health care. The network is spread throughout the country. Major diseases leading to mortality are TB and HIV/AIDS, and the latter is a major increasing problem in Lesotho due to poverty and the ignorance of basic health practices by the majority of the population. The number of adults and children living with HIV/AIDS at the end of 1997 was estimated at 4% of the population. This is probably an underestimate due to under-reporting.

. Gender⁶

As in most rural communities of developing countries, women in Lesotho are responsible for most of the farming and other household activities such as the collection of fuel and water, and for childcare. Their importance, however, is not reflected in their access to social services, credit, land, other assets, and technology. Those who are literate tend to find fewer and more poorly paid jobs than men. Women under 21 years of age are considered minors and cannot enter into contracts unless assisted by their guardian, and those married have no legal power without their husband's explicit consent. However, in recent years, some improvements have been made. For instance, under the new Land Entitlement Act, women are allowed to own land in their own right for the first time, and the opportunity to lease land favors women. Many women are also engaged in labor intensive activities such as food for work projects. Pay differentials based on gender have been removed in the civil service, and since 1992, married women have been entitled to pension benefits.

On the other hand, the gender bias favors girls (in the mountain areas) over boys at an early age. Boys tend livestock and as a result girls usually get more primary schooling than boys. Livestock herding is also associated with inadequate eating habits, which result in higher levels of malnutrition in boys than in girls. At a later stage, this situation forces many Basutho males in the Highlands to seek unskilled labor intensive jobs such as mining in South Africa. This trend leaves many women with almost all household responsibilities.

In total, more than 50% of Lesotho households are female-headed.

⁶ African Development Bank. 2000.

. Land Use

The country's principal resources are its land, water and people. Agriculture is the dominant land use and the country's climate is conducive to the cultivating of most temperate crops including maize, sorghum, wheat, beans, peas and a wide variety of other vegetables and a variety of soft and hard fruits. The potential for commercial crop production is greatest in the lowland areas which contain about 75% of the country's arable crop land. Localized droughts and early and late frosts can threaten crop production.

The mountain areas of the country are dominated by rough grazing due to the paucity of arable soils. Livestock in the mountains is considered to be at, or close to, the ecological carrying capacity.

. Environmental Issues

Environmental problems facing Lesotho arise from a number of physical and economic factors. Lesotho occupies an area of 30,350 km², most of which is rugged mountain terrain. Climatic conditions, largely determined by altitude, are subject to wide seasonal and geographical variation. Mean annual rainfall figures range from 600mm in the southern and western lowlands to 1,600mm in the north-eastern highlands. Frost and heavy snowfall, particularly in the mountain areas, are common during the winter months. Nevertheless, the country remains vulnerable to frequent drought, which has been manifest in recent times.

Lesotho is threatened by desertification through soil erosion and land degradation. Soil is lost through water and wind effects. Loss of organic content and nutrients from the soil due to poor agricultural practices and various forms of biomass removal lead to reduction of soil water-holding capacity and decreased soil depth that hinders proper root development, leading to poor aeration and drainage and general damage to soil structure. The dearth of energy sources and rampant poverty in rural areas is a principal cause of the removal of tree and other vegetative cover, which exacerbates soil erosion and degradation of ecosystems. Estimated annual loss of soil through erosion is over 40 million tons, comprising sheet and rill erosion of 15.5 million tons, crop and rangelands of 24 million tons, as well as 74,000 tons/ha attributed to gully erosion. Land suitable for cultivation and grazing is becoming more scarce. Degraded rangelands, rock and gullies occupy the largest proportion of the land. Forest cover has been reduced, giving rise to serious soil erosion caused by rapid water run-off, reduced infiltration and aquifer recharge rates. There is a real threat of rivers drying up and the lowering of groundwater levels.

Development activities in the Highlands, notably the Lesotho Highlands Water Project, are placing increased pressure on plant and animal species that are already threatened or vulnerable.

6. ENVIRONMENTAL ASSESSMENT

6.1 Important Environmental Components

The important environmental components identified are listed in Table 6.1.

Table 6.1: Important Environmental Components

Biophysical IECs:	Socioeconomic IECs:
Soil quantity	Personal property
Soil quality	Noise
Habitat	Aesthetics
Fauna	Social patterns
Urban vegetation	Cultural values
Water regulation	Public safety
Water quality	Agricultural land
	Settlement
	Health

6.2 Project Benefits

The benefits of the project are highly significant. Domestic electrical energy will allow households to cook more efficiently, to carry out domestic chores for longer hours, provide children with light by which to study, as well as light by which adults can read and improve their education, and provide light for security purposes. In general, the supply of domestic electricity will allow women, who do most of the domestic management, to carry out their tasks, such as food preparation, more efficiently. Small businesses and shops will be able to remain open for longer hours, providing a more efficient service to their clients and in the case of food stores, provide a wider range of foods that previously could not be kept due to spoilage. Domestic and small business electricity supply improves local socioeconomic conditions.

6.3 Impact Analysis

A total of 16 potential impacts have been identified. Of these, four are rated High, two are Moderate to High, two are Moderate, three are Low to Moderate, and four are Low. These are presented in Table 6.2.

Table 5.1: Potential Impacts

Impact	Indirect Impact	Cause and Effect	Level of Significance	Practical Mitigation	Residual Impact
Biophysical:					
Soil erosion	Waterway sedimentation and modification of habitat	Loss of vegetation during construction (trampling, pole placement, cable burying). Agricultural soil compaction during access Effect: reduced biodiversity; productive soil losses	M – H	Activity carried out during dry season. Avoidance of sloping areas. Revegetate ground stripped of vegetation.	None
Loss of trees and shrubbery	Loss of aesthetics. Loss of shade Loss of food and other material sources	Pole placement on sites covered by a tree or important shrubbery Removal of vegetation for access purposes Effect: Loss of income; loss of well being	L	Avoid pole placement in sites covered with important vegetation. Select least harmful access routes.	None
Habitat loss	Loss of biodiversity	Removal of vegetation for pole placement or for access	L	Avoid natural areas for pole placement and access.	None
Disruption of drainage	Flooding	Work activities accidentally or intentionally disrupting natural drainage courses Effect: Loss of crops and income; damage to structures	L-M	Ensure that site conditions including micro topography restored after installation.	None
Loss of wildlife	Vulnerable bird species populations depleted	Additional electrical lines could cause interference with bird populations, particularly in rural areas Effect: Population reduction, particularly of vulnerable species. Low impact since low lines not as serious an impediment as large transmission lines	L	Ensure that connecting lines not placed in known flight paths.	Low

Soil and water contamination	Contaminated domestic water supply; modified/lost aquatic ecosystem	On site vehicle maintenance - fuel spillage / used oil disposal - ineffective storage of transformers and other equipment that leak lubricants Effect: Ill health – lost work days and lost income	H	No on-site maintenance unless an emergency; safe practices followed Proper storage of equipment and materials	None
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Socioeconomic:					
Property damage	Cost to property owner	Careless driving; careless handling of poles and cable. Effect: Economic hardship to property owner	M-H	Efficient and effect construction standards and work habits followed.	None
Noise	General annoyance	Noisy workers; running vehicles Effect: Ill health – stressful	L	Workers on the job to discuss only work and in a quiet manner; vehicles running only when necessary and avoidance of engine revving	None
Aesthetics	Negative psychological effect	Pole placement and transmission line; litter from construction. Effect: Ill health - stress	L-M	Careful placement of; Total cleanup following construction	Low
Social and cultural disturbance	Annoyance	Construction activities during religious ceremonies or social functions and celebrations; during periods of rest. Effect: Ill health - stress	L-M	Schedule work during normal working hours and during normal work week; avoid special celebration times	None
Harassment	Stress	Workers bothering residents and neighbors. Effect: Ill health	M	Workers to carry out duties within strict code of conduct.	None

Occupational hazards and injury		Careless work habits leading to workers and members of the public being injured Poor storage of materials and equipment Effect: Ill health; loss of work; loss of income	H	Work carried out in accordance to strict occupational work regulations – including e.g. use of safety clothing and equipment; work area signage; safety guards; public awareness on site. Storage areas to be well managed and out of bounds to non-essential staff and the public.	None
Disturbance of agricultural land	Loss of food production	Vehicles accessing across agricultural lands; workers trampling crops Effect: Loss of food and loss of income	H	Avoid agricultural lands; access only following harvest; restore compacted soil	
Resettlement	Loss of livelihood and loss of cultural and social placing	Poles and lines situated where houses have to be removed. Effect: Psychological stress	H	Ensure that no alignments will necessitate any resettlement.	None
Poor health	Medical costs	Children (and adults) handling creosoted poles. Effect: Skin burns	M	Verbal and posted warnings to be provided	Low

6.4 Cumulative Effects

The potential impacts are few and for the most part not significant. However, an impact that is repeated at every site where an electrical power connection is made leads to an accumulation of impacts that together could lead to a highly significant negative result. This will be far more serious than any of the individual impacts. For instance, a very small quantity of litter at one connection site (e.g. a small piece of surplus and non-useable wire) is of no consequence. However, when multiplied at 7,000 sites would result in a more significant litter impact over the area. Similarly, a small loss of lubricant at one site, multiplied over an area sharing a common groundwater supply, could result in a highly significant impact on the groundwater source. In addition, the accumulation has to be considered in light of other development activities that contribute to negative impacts. A small amount of noise generated by the work crew may be insignificant on its own, but combined with other noises in an urban area may be the additional amount that would result in the public considering noise in general to be a nuisance. These are small matters but if not contained can lead to significance impacts.

The contribution that the project's impacts will make to the overall cumulative impact of the areas within which the project will be operating is extremely low.

6.5 Residual Impacts

For the most part, mitigation will be met through following a code of conduct and good practices. If mitigation, as indicated, is effective, the only residual impacts will relate to aesthetics and health and these are minor. Pole placement and a landscape of wires where none were present before, may be considered an intrusion by some and a lessening of aesthetics. This is a matter of opinion and certainly the benefits of electrical supply will far outweigh the minor possible aesthetic impact. On the matter of health, children being children, they will climb and touch new poles and may sustain some burning sensation and possible rashes as a result of newly creosoted poles. It is unlikely that children would ingest any of the creosote through contact with the poles, but if this does happen, sickness could occur. Generally, however, residual impacts will be extremely limited and minor. Further investigation into wood preservatives being used and their effects on human health and the biophysical environment is warranted.

6.6 Environmental Enhancement

The LEC is not responsible for contributing to environmental enhancement and there would be no funds in the program to do so. Enhancement could be a condition in the case where impacts are serious and residual and where such enhancement would at least partially compensate for the residual impacts. However, in this case there are no significant residual impacts to be addressed.

7. ANALYSIS OF PROJECT ALTERNATIVES

There are two project alternatives. Pursuing a 'No Project' alternative would mean that none of the project benefits would be realized and the benefits for this project far outweigh the very minor and insignificant impacts (notwithstanding a potential health impact re: wood preservatives) to be expected.

Alternative forms of energy are being pursued, including solar and wind. Solar energy is currently in use on some properties, and although environmentally benign, the cost is still high, making a 'Solar Energy' alternative unfeasible. Wind generation would have to be conducted on a large scale and would still require transmission of power from the source to the individual residences and businesses. This would still necessitate the need for individual connections.

8. ENVIRONMENTAL MANAGEMENT PLAN

8.1 Purpose and Intent

The environmental management plan provides the guidelines to be followed by the proponent to ensure that impacts are avoided. For those impacts that can not be avoided, the plan provides suggestions for minimizing the impacts. The plan details the steps to be taken, the scheduling of activities, responsibilities and an indication of cost levels for mitigation. The plan also addresses the need for monitoring, including reporting, and recommends environmental training to be conducted.

8.2 Mitigative Measures

Table 8.1 provides a description of the mitigative measures to be taken, the responsibilities for implementing these measures, and the cost implications and scheduling for mitigation.

Table 8.1: Mitigative Measures, Responsibilities, Scheduling and Costs

Impact	Mitigation	Responsibility	Scheduling	Cost
Soil erosion as result of vegetation loss and soil compaction during construction	Follow good practice directives (pole placement and crew movement to avoid loss of vegetation and soil compaction)	Work crew	At time of activity	No additional cost
Loss of trees and shrubbery	Follow good practices (pole placement to avoid loss of vegetation)	Work crew	At time of activity	Possible slight cost due to not being able to follow straight line from power source to residence
Habitat loss	Follow good practices (avoid disturbance of natural vegetation)	Work crew	At time of activity	Possible slight cost due to not being able to follow straight line from power source to residence
Disruption of drainage	Follow good practices (avoid interference with drainage patterns)	Work crew		
Soil and water contamination	Follow good practices (avoid fuel spillage: collect used lubricants for recycling; and ensure no leaky transformers or other equipment)	Work crew Supply and maintenance teams	At all times	Insignificant additional costs
Property damage	Follow good practices. Provide training for drivers and work crews re: handling of equipment and supplies	Work crews Supervisory management Safety inspectors/ trainers	Prior to activities	Small cost for training and lectures to workers

Noise	Follow good practices. (sensitivity to disturbance of others)	Supervisory management	Prior to activities	Small training costs
Aesthetics	Follow good practices. (do not litter)	Supervisory management	Lecture prior to activities. Carry out during activities	Small training costs
Social and cultural disturbances	Follow good practices. (respect for local customs)	Supervisory management	Flexible work schedule	No costs other than those attributed to minor work delays
Harassment	Follow good practices. (respect for others-zero tolerance for harassment)	Supervisory management	At time of activity	No costs
Occupational hazards and injuries	Safety code to be followed.	Supervisory management and safety trainers and inspectors	At time of activity	Safety training costs (minor if safety officer on staff)
Disturbance of agricultural land	Follow good practices. (recognition and respect for agricultural land). Land to be returned to condition prior to work activity. Compensation for crop losses.	Work crews	At time of activity	Small cost due to time delays in avoiding disturbing agricultural land / or rehabilitating it afterwards. Cost of compensation for lost crops.
Resettlement	Placement of poles and lines to avoid loss of houses and resettlement	Planning and work crews	Planning stage and at time of activity	Small cost to avoid resettlement (less cost than resettlement cost)
Poor health	Notification verbal and written re: toxicity of creosote	Planning and safety inspector	Planning stage, and immediately before activity commences	Small to moderate cost to inform residents.

8.3 Good Practices Directive

Table 8.2 provides a basis for a good practices directive which can be built upon to address other activities of LEC that are not included in this project.

Table 8.2: Good Practices

Subject	Practice Required
Soil erosion	.ensure work areas do not occur on erosion prone sites .care taken not to damage or remove vegetation from erosion prone sites .avoid compaction of soil, particularly on erosion prone sites .rehabilitate any site where vegetation has been removed or where soil has been compacted
Vegetation	.avoid trampling or driving on vegetation; and, avoid removal of vegetation .rehabilitate any damaged site
Habitat	.avoid disturbance of wildlife habitat including aquatic habitats
Drainage	.avoid disruption of natural or man-made drainage systems .rehabilitate any drainage system damaged through work activities
Soil contamination	.avoid spillage of fuels, lubricants and other chemicals .ensure proper storage of new and used fuels, lubricants and chemicals .collect used lubricants for recycling
Water contamination	.avoid spillage of fuels, lubricants and other chemicals .ensure proper storage of new and used fuels, lubricants and chemicals .collect used lubricants for recycling
Personal property	.care to be taken during work activities to avoid damage to personal property .rectify any damage caused
Noise	.ensure all vehicles properly fitted with silencer systems .avoid unnecessary running and revving of engines .work force to discuss only work matters with one another and at minimal vocal levels
Aesthetics	.ensure pole placement does not interfere with aesthetics by discussing with land owners .remove all litter from site, for proper disposal
Social and cultural values	.ensure work schedules do not interfere with social or cultural events
Harassment	.discussions with property owners or casual observers for purposes of achieving tasks only
Hazards and Injury	.proper safety clothing and gear to be worn at all times on work site .verbal and written warnings to be issued to households and community
Agricultural land	.avoid driving on agricultural land and avoid disturbance of soil, crops, drainage and associated infrastructure (e.g. irrigation system) .ensure rehabilitation of disturbed land
Resettlement	.avoid connection activities that could lead to resettling of people
Health	.ensure local people are warned of toxicity of creosoted poles

8.4 Training

A major training input will be required for the LEC's designated environmental officer. This officer should be allowed to take advantage of any regional or offshore short courses in environmental management, environmental assessment and environmental monitoring. Such courses should be at the introductory level, given that anyone designated as environmental officer will probably be recruited from within the organization and will have little or no background in the social and biophysical sciences. As part of the project, a training component should include an environmental awareness workshop for the environmental officer as well as a number of the field staff who will be dealing with the environmental issues described in the environmental review report. Such an awareness course should be extended to management staff as well.

The environmental officer should also be given a short training course in environmental monitoring. This will provide the officer with the skills required to investigate in the field whether or not the management plan is being implemented effectively.

8.5 Monitoring and Reporting

The project will be monitored on a regular basis to ensure that the management plan is implemented effectively. The environmental officer will be responsible for monitoring and will carry out this function in a systematic manner and on a regular basis. Monitoring technique and procedures will be taught through a short environmental monitoring course (see Section 8.4).

For monitoring to be effective, monitoring findings must be reported to management. There must be a system in place to ensure that these findings are provided with timely and effective responses by management.

A detailed monitoring plan and procedure will be developed during the monitoring training course.

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